

Case 3245

Hastigerinella* Cushman, 1927 and *Clavigerinella* Bolli, Loeblich & Tappan, 1957 (Rhizopoda, Foraminiferida): proposed conservation of the usage by designation of *Hastigerina digitata* Rhumbler, 1911 as the type species of *Hastigerinella

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Abstract. The purpose of this application, in relation to Articles 11.10, 49 and 67.13 of the Code, is to conserve the widespread usage of the generic names *Hastigerinella* Cushman, 1927 for a group of extant planktonic foraminifera and *Clavigerinella* Bolli, Loeblich & Tappan, 1957 for a group of fossil foraminifera by designating *Hastigerina digitata* Rhumbler, 1911 as the type species of *Hastigerinella*. Rhumbler (1911) had, by misidentification, used the specific name of *Globigerina digitata* Brady, 1879 for his taxon. As a result of this misuse of the name, some authors have argued that *Hastigerinella eocanica* Nuttall, 1928 is the valid type species of *Hastigerinella*. However, acceptance of this view would confuse the accepted meaning of *Hastigerinella* and *Clavigerinella*.

Keywords. Nomenclature; taxonomy; Foraminifera; HASTIGERININAE; *Hastigerinella*; *Clavigerinella*; *Hastigerina digitata*; *Clavigerinella akersi*.

1. In 1879 (p. 599), Henry Brady described the living planktonic foraminiferal species *Globigerina digitata* collected during the H.M.S. *Challenger* Expedition. Although no illustrations were included with the original description, accurate illustrations of *G. digitata* showing its distinctive finger-like (digitate) final chambers were presented in a later report (Brady, 1884, pl. 80, figs. 6–10; pl. 82, figs. 6, 7). The illustrations included two different digitate morphotypes, which are now widely regarded as being distinct species. These are now referred to as *Globigerina digitata* Brady, 1879 (currently *Beella digitata*) (see Brady, 1884, pl. 80, figs. 6–10) and *Globigerinella adamsi* (Banner & Blow, 1959) (p. 13) (see Brady, 1884, pl. 82, figs. 6, 7).

2. In 1895 Ludwig Rhumbler (p. 94) published a taxonomic revision in which he transferred the nominal species *Globigerina digitata* Brady, 1879 to the genus *Hastigerina* Thompson, 1876 (p. 534). *Hastigerina* (type species *Hastigerina pelagica* (d'Orbigny, 1839) (p. 27)) has a very different shell wall structure to all other planktonic foraminifera and *H. digitata* Rhumbler is one of the few other described species that exhibits the same unusual wall texture. In 1911 (pp. 163, 202), Rhumbler described and illustrated living foraminifera collected during the Humboldt Plankton-Expedition, including *Hastigerina digitata*. He did not cite any authorship of the name *digitata*. A copy of unpublished plate explanations for Rhumbler's 1911

work was presented as an anonymous note in an edition of *The Micropaleontologist* (Anonymous, 1949), copied from an original manuscript held in the library of the Zoological Institute, University of Göttingen, Germany, by Dr Otto Wetzel. This material indicated that Rhumbler considered his forms to be two new varieties of *Hastigerina digitata* (Brady, 1879). Another copy of the manuscript, which was presented to Edward Heron-Allen in 1928 by Rhumbler himself, is held in the Heron-Allen Library at The Natural History Museum, London. I have examined this manuscript and can confirm that Rhumbler had intended to use Brady's name *Hastigerina digitata*. However, Rhumbler's figured fossil specimens show a different shell ultrastructure to those of Brady's living specimens. In fact, *H. digitata* sensu Rhumbler, 1911 represents a digitate homeomorph that is closely related to the Recent species *Hastigerina pelagica* (d'Orbigny, 1839) and is clearly unrelated to *Beella digitata* (Brady, 1879). It is evident that Rhumbler (1911) misapplied Brady's name *digitata*.

3. In 1927 (p. 87), Cushman established the genus *Hastigerinella* and designated *Hastigerina digitata* Rhumbler, 1911 as the type species (he used the incorrect spelling '*Hasterigerina*' *digitata* in the type species designation). Many workers have since based their concepts of the genus on this definition (e.g. Bolli, Loeblich & Tappan, 1957; Bradshaw, 1959; Banner & Blow, 1959; Blow, 1979; Bolli & Saunders, 1985; Hemleben et al., 1989). Following traditions of uniting species of foraminifera with similar morphologies in the same genus irrespective of stratigraphic occurrence, the concept of *Hastigerinella* was later enlarged to include fossil species from the Eocene (*Hastigerinella eocanica* Nuttall, 1928 (p. 376), *H. jarvisi* Cushman, 1930, *H. eocanica* var. *aragonensis* Nuttall, 1930, *H. colombiana* Petters, 1954, *H. caucasica* Subbotina, 1958) and from the Cretaceous (*H. watersi* Cushman, 1931, *H. alexanderi* Cushman, 1931, *H. simplex* Morrow, 1934, *H. biozonae* Chevalier, 1961) and Miocene: *H. bermudezi* Bolli, 1957 (currently *Clavatorella bermudezi*). However, Cushman (1930) still emphasized that the original concept of the genus was based upon Rhumbler's living material.

4. Bolli, Loeblich & Tappan, 1957 (p. 30) described a new digitate genus *Clavigerinella* from the Eocene of Trinidad and designated *C. akersi* Bolli, Loeblich & Tappan, 1957 (p. 30) as the type species. Bolli (1957, p. 162) in the same volume discussed the similarity of *C. akersi* to species of *Hastigerinella* described from the Eocene. Accordingly, he placed *H. jarvisi* Cushman, 1930 (p. 18) in *Clavigerinella* and indicated that *H. eocanica* Nuttall, 1928 also belonged in that genus. Many later authors (e.g. Banner & Blow (1959, p. 10), Blow (1979, p. 1199), Toumarkine & Luterbacher (1985, p. 119), Banner (1982), Pearson (1993, p. 219) and Coxall et al. (in press)) have adopted Bolli's (1957) view that the Eocene digitate species are congeneric, and include them all in *Clavigerinella*. However, not all authors have followed this approach and some continue to separate *Hastigerinella eocanica* from *Clavigerinella* (see Saito, Thompson & Breger, 1976; Loeblich & Tappan, 1988). Based on detailed morphological and stratigraphical studies I conclude that the Eocene digitate forms share many derived features, are stratigraphically contiguous and are therefore probably phylogenetically related. Thus, I strongly support the view that they are congeneric and should be united in *Clavigerinella*.

5. Galloway (1933) attempted a revision of the taxonomy of *Hastigerinella*. Banner & Blow (1960) reviewed the subfamily HASTIGERININAE. The latter authors were

unable to locate Rhumbler's original specimens but based on examination of new material from the Atlantic Ocean confirmed that the morphotype had distinctive 'hastigerinid' morphology, as portrayed in Rhumbler's (1911) illustrations. The authors selected a suite of 'hypotypes' (p. 25) (Natural History Museum, London Cat. nos. BMNH 1959.5.11.742 and 1959.5.11.744-746); one of these was later designated as the neotype of *Hastigerina digitata* Rhumbler, 1911 (*Hastigerinella digitata*) by Banner (1965, p. 115; see para. 9 below).

6. In 1963 (p. 228) Charmatz disputed the status of *Hastigerina digitata* Rhumbler, 1911 as the type species of *Hastigerinella*, claiming the genus to be 'without a type species at the time of publication' in 1927. Charmatz proposed that the second nominal species that had been included in *Hastigerinella*, the Eocene species *Hastigerinella eocanica* Nuttall, 1928 (currently *Clavigerinella eocanica*), should automatically become the type species of the genus by subsequent monotypy.

7. In response to Charmatz's article, Loeblich & Tappan (1964, p. 494) argued that Charmatz's conclusions were 'strongly at variance' with the Code. Loeblich & Tappan (1964) claimed that the type species of the genus *Hastigerinella* was validly designated by Cushman, 1927 as *Hastigerina digitata* Rhumbler, 1911 with explicit reference to the original figures and publication. They concluded that later workers were formally correct in assuming this to have been proposed as a new nominal species, since it is not clear from Rhumbler's inadequately annotated and referenced publication that another author (i.e. Brady, 1879) was responsible for the specific name *Hastigerina digitata*.

8. In response, Charmatz (1964, p. 496) vehemently defended his earlier work, maintaining that *Hastigerina digitata* Rhumbler, 1911 was 'taxonomically non existent'. Nevertheless, in an effort to stabilize the nomenclature Charmatz said that he would apply to the Commission for resolution of the situation. There is no record of this action having been taken.

9. Banner (1965) made an informal case for acceptance of *Hastigerina digitata* Rhumbler, 1911 as a valid nominal species under the Code. Contrary to Charmatz, he argued, 'even if the authorship of *Hastigerina digitata* be denied to Rhumbler (1911), the fact that Cushman proposed the new genus *Hastigerinella* with *Hastigerina digitata* Rhumbler, 1911 as its type species would be sufficient to validate the species name'. At the same time, he designated (p. 115) a neotype for *Hastigerina digitata* Rhumbler, 1911 (see Banner & Blow, 1960, figs. 8a-c; BMNH Cat. no. 1959.5.11.744), having established that the original syntype suite was lost. In the same publication, Banner also suggested that this difficult case would be well served by an appeal to the Commission, but again no such action was taken (M. Fadel and F.T. Banner, pers. comm.).

10. The nomenclatural status of *Hastigerina digitata* Rhumbler, 1911 was again disputed by Saito, Thompson & Breger (1976). Following Charmatz's arguments, Saito et al. contended that Rhumbler's (1911) misleading citation rendered the name and nominal species 'non existent'. They concluded that *Hastigerinella* was 'without a type species' at the time of publication and deemed *Hastigerinella eocanica* Nuttall, 1928 the type species of the genus by subsequent monotypy. However, Saito et al. (1976, p. 285) agreed that Rhumbler's 1911 form represented a distinct morphotype that was clearly unrelated to *Globigerina digitata* Brady, 1879. They gave the entirely

new name *Hastigerinopsis digitiformans* Saito & Thompson (p. 285) to Rhumbler's taxon using Banner's (1965) neotype of '*Hastigerina digitata* Rhumbler, 1911' (see para. 9 above) as the holotype.

11. In the most recent treatment of extant planktonic foraminifera Hemleben et al. (1989) presented a classification based upon details of wall texture and spine morphology, features that are believed to most closely reflect phylogenetic and biological affinities. In this work, the nominal species *Hastigerina digitata* Rhumbler, 1911 is classified together with *Hastigerina pelagica* (d'Orbigny, 1839) under the heading 'Hastigerinids with triradiate spines'. Christoph Hemleben (pers. comm.) has commented recently that the ultrastructure of *H. digitata* is identical to that of *H. pelagica*, suggesting a very close evolutionary relationship between the two, and he argues for inclusion of *H. digitata* within *Hastigerina*, as was originally intended by Rhumbler (1911).

12. Charmatz's (1963, 1964) and Saito et al.'s (1976) type species proposals invoke a major shift in the concept of *Hastigerinella* from being a taxon representing Recent digitate forms with a distinctive *Hastigerina*-like wall and triradiate spines to Eocene fossils, that probably possessed rounded spines, have an entirely different wall structure and mode of coiling and a disjunct stratigraphic occurrence. Moreover, it calls into question the taxonomic status of the genus *Clavigerinella* Bolli, Loeblich & Tappan, 1957 (see para. 4 above). If, as proposed by Charmatz (1963), the type species of *Hastigerinella* is not the modern hastigerinid *Hastigerina digitata* (as was implied by Cushman) but the Eocene *Hastigerinella eocanica* and, as is widely believed, all the Eocene digitate forms are congeneric, *Clavigerinella* would become a junior synonym of *Hastigerinella*. This would cause extreme confusion in the current understanding of both *Hastigerinella* Cushman, 1927 and *Clavigerinella* Bolli, Loeblich & Tappan, 1957 as used throughout the literature (e.g. Blow, 1979; Kennett & Srinivasan, 1983; Bolli & Saunders, 1985; Toumarkine & Luterbacher, 1985; Loeblich & Tappan, 1987; Hemleben et al., 1989).

13. In agreement with Loeblich & Tappan (1964) and Banner (1965, 1982), I reject Charmatz's (1963, 1964) and Saito et al.'s (1976) conclusion that the original type species of *Hastigerinella* (i.e. *Hastigerina digitata* Rhumbler, 1911) is invalid under the Code. However, as previous attempts to resolve this case merely by discussion and reference to relevant articles of the Code have failed, I bring this application to the Commission for a formal resolution. Maintenance of the current widespread usage of both *Hastigerinella* Cushman, 1927 and *Clavigerinella* Bolli, Loeblich & Tappan, 1957 can be achieved by accepting that *Hastigerina digitata* Rhumbler, 1911 is the type species of *Hastigerinella*, in accordance with the view of Banner & Blow (1959), Banner (1982) and Hemleben et al. (1989).

14. It might perhaps be held, under Articles 11.10 and 67.13, that there is a nominal species *Hastigerinella digitata* Cushman, 1927, and that this is the type species of *Hastigerinella*. However, this 'new' authorship would cause unnecessary confusion. It is also necessary to protect the specific name *digitata* Rhumbler, 1911 from the operation of Article 49 of the Code, since *digitata* Brady, 1879 had been applied to the taxon by misidentification.

15. The International Commission on Zoological Nomenclature is accordingly asked:

- (1) to use its plenary power to rule that the name *digitata* Rhumbler, 1911, as published in the binomen *Hastigerina digitata*, is deemed to be the

specific name of a then-new nominal species and is not to be treated as a misidentification of *Globigerina digitata* Brady, 1879;

- (2) to place on the Official List of Generic Names in Zoology the following names:
 - (a) *Hastigerinella* Cushman, 1927 (gender: feminine), type species by original designation *Hastigerina digitata* Rhumbler, 1911;
 - (b) *Clavigerinella* Bolli, Loeblich & Tappan, 1957 (gender: feminine), type species by original designation *Clavigerinella akersi* Bolli, Loeblich & Tappan, 1957;
- (3) to place on the Official List of Specific Names in Zoology the following names:
 - (a) *digitata* Rhumbler, 1911, as published in the binomen *Hastigerina digitata* and as defined by the neotype cited in para. 9 above and ruled in (1) above to be deemed to be the specific name of a then-new nominal species (specific name of the type species of *Hastigerinella* Cushman, 1927);
 - (b) *akersi* Bolli, Loeblich & Tappan, 1957, as published in the binomen *Clavigerinella akersi* (specific name of the type species of *Clavigerinella* Bolli, Loeblich & Tappan, 1957).

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